Intel Express 100BASE-TX Switching Hub

User Guide

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Contents

Quick Start

1. **Install the Express 100BASE-TX Switching Hub in a rack or on a shelf or table, plug the cord in, and turn the power on. See page 5 (steps 1 and 2).**

Brackets and screws for standard 19-inch equipment rack placement.

Rubber feet for shelf or table placement.
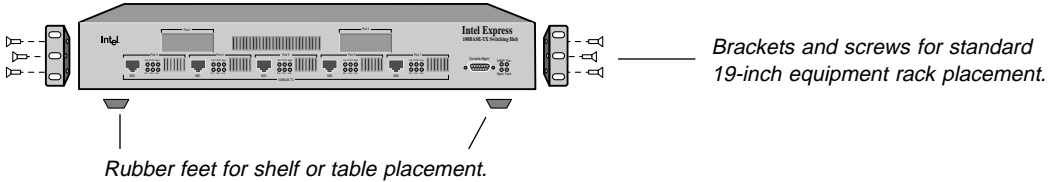
2. **Connect the network devices to the switch. See page 5 (step 3) and pages 10–12.**

Straight-through cables to hubs

Crossover cables to servers/workstations

100BASE-TX hub

100BASE-TX server/ workstation
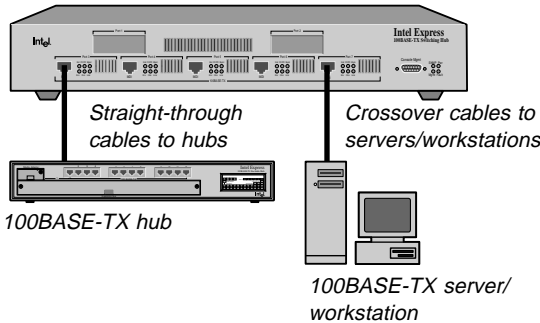
NOTES
- Connect only 100 Mbps devices to the switch. See page 12 for information on connecting to 10 Mbps segments.
- The default configuration for each port is half duplex mode only.
- Always use Category 5 cabling.

3. **Check the LEDs for power and links. See pages 6 and 7.**

Console Mgmt

SNMP Pwr

Mgmt Fault

Should always be on.

Lights briefly while the switch performs self-tests.

Blinks every two seconds.

Port 3

Xmt FC/FD Mgmt

Rcv Clsn Link

MDI
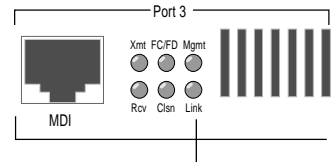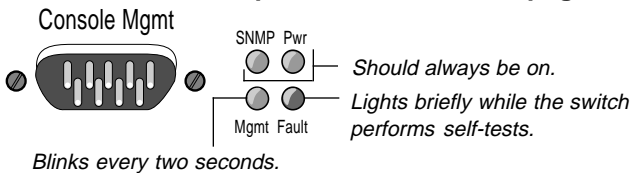
Lights when device is plugged into the port.

Next steps (Optional)

- Continue to the next page if you want to configure the switch to work with an SNMP-compliant Network Management System (NMS).
- See Chapter 2 if you want to use the Console Manager to change port configurations (set a port for full duplex), assign an IP address, or check port statistics.

(Optional) Quick Start for SNMP Management

4. Use the null-modem cable to connect the Console Mgmt port to a COM port on a workstation.

Console Mgmt
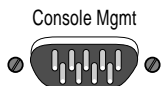
A null-modem cable is provided with the switch.

5. Open a terminal emulation program (such as Terminal in Microsoft Windows* 3.1). Specify these communication parameters:

- 9600 baud
- 8 data bits
- No parity
- 1 stop bit

6. Press ⏎ Enter and log into the Console Manager:

```
Login:
password:
```

By default, no password or user name is assigned. If you enter one, it is saved upon reset.

7. Set the IP configuration using the `set-ip-conf` command:

```
set-ip-conf 192.1.1.64 255.255.255.0 192.1.1.255  ⏎ Enter
```

Replace these addresses with the numbers for your network. Specify the IP address, netmask (subnet mask), and broadcast address, in that order.

8. Download the Intel MIB (Management Information Base) file from an Intel online service and compile into your NMS.

The MIB filename is SWCH1MIB.EXE. You can find the file on Intel's Customer Support web site (http://www-cs.intel.com) or the Intel BBS (see inside back cover). See your NMS documentation for instructions on compiling the MIB for a new device.

1 Hardware Installation and Network Topology

Overview

The Intel Express 100BASE-TX Switching Hub is a 5-port Fast Ethernet switch featuring five 100BASE-TX ports and two slots for optional 100BASE-TX or 100BASE-FX media adapters. Each 100 Mbps port supports a Fast Ethernet segment, up to a total of 1024 cached nodes for the switch.

The switch increases the available bandwidth and extends the distance of Fast Ethernet installations by dividing the network into segments and insulating each from the others' local traffic. Additionally, by configuring a link for full duplex, you can establish a 200 Mbps link between the switch and another switch, server, or workstation. This is especially useful for busy file servers that are accessed by multiple segments.

Data transfer delays are eliminated through the switch's parallel store-and-forward architecture with direct port-to-port transfer. Selective flow control improves performance by preventing lost packets due to buffer overload.

Security features include the creation of custom filters and virtual networks (VLANs). You can define any custom filter based on multicast/broadcast, source port, destination port, and destination address. VLAN features include the ability to set broadcast or multicast domains. See Chapter 2 for information on configuring VLANs.

The switch also has a built-in SNMP (Simple Network Management Protocol) agent and can be monitored and controlled through any SNMP-compliant Network Management System (NMS). See page 20 for information on using the switch with an SNMP NMS and getting the switch's MIB (Management Information Base) file.

Features

- Five RJ-45 Fast Ethernet ports
- Two expansion ports for optional 100BASE-TX or 100BASE-FX media adapters
- Standard 19-inch rack-mount chassis (rack-mount kit included)
- Auto-ranging power supply (automatically adjusts to any voltage between 90 VAC and 264 VAC at 50/60 Hz)
- Full duplex selectable on each port
- Flow control selectable on each port
- 1024 address cache entries
- Custom filtering table
- Serial console port with password protection
- SNMP support (see Appendix A for MIB information)
- Spanning tree protocol support
- Built-in remote monitoring (RMON) support (Group 1)

Installation and Setup

1   Install the switch in a rack or on a shelf.

For rack placement, connect the switch to a 19-inch rack using the enclosed rack mount brackets.

For shelf placement, attach the enclosed rubber feet to each corner of the bottom of the switch and place it on a flat, level surface.

2   Plug the switch in and turn the power on.

Plug the switch into an active AC outlet and turn the power on. A built-in power supply automatically adjusts to any outlet providing between 90 VAC and 264 VAC at 50/60 Hz.

NOTE
The switch will only work with 100 Mbps devices. For a 10BASE-T connection, see page 12.

3   Connect the Fast Ethernet devices.

For optimum performance, the Fast Ethernet segments connected to the switch must be configured carefully. Follow these general guidelines:

- Connect only 100 Mbps devices to the switch. The switch will not work with 10 Mbps devices. See page 12 for information on connecting to a 10 Mbps segment.

- Always use Category 5 unshielded twisted-pair (UTP) cable when plugging devices into 100BASE-TX ports.

- Limit the distance between devices connected with UTP cable to 100 meters.

- Use a crossover cable when directly connecting a workstation, server, or another switch to the switch. Use straight-through cables when connecting to a repeating hub or concentrator.

- Configure the network so devices that primarily talk to each other are on the same segment. Each port on the switch is defined as a single Fast Ethernet segment.

4   Is setup complete?

If you're using the switch as a stand-alone device (not under the control of network management software), you're done.

If you want to change the default configuration (shown in Appendix A) or manage the switch, continue to Chapter 2.

Using the Switch

The switch requires minimal user intervention. It automatically learns the addresses of new stations as they appear, and will relearn addresses dynamically if the network is reconfigured.

Each of the Fast Ethernet ports has six status LEDs. There is a separate bank of four LEDs for the management status.

Port status LEDs

Port LEDs provide information about the port's configuration and the status of devices connected to the ports.

Xmt   **Transmit.** Lights when the switch is transmitting packets on this port.

Rcv   **Receive.** Lights when packets are received on this port, even if they are not forwarded.

FC/FD **Flow Control (default)** *or* **Full Duplex.** Blinks on when flow control is activated. If flow control is disabled, the LED blinks on when a packet is lost. If full duplex is enabled on the port, the LED is normally on continuously, and blinks off when a packet is resent. Flow control is not possible, nor needed, when full duplex is enabled.

Clsn **Collision.** Lights whenever a collision occurs while the port is transmitting. Collisions are normal in an Ethernet environment. However, if the collision LED is on continuously, you may have a problem with a device on the segment.

Mgmt **Management.** Lights when the management agent checks the port (normally, every two seconds).

Link **Link.** When solid, indicates a connection is established. If the Link LED is off, check for loose cable connections. Also, make sure you're using the correct type of Category 5 cable, either straight-through or crossover. See page 9 for more information.

Management status LEDs

Management status LEDs provide information about the overall operation of the switch and its SNMP management components.
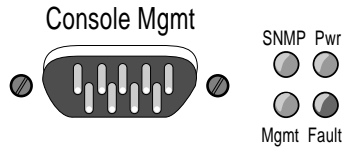
SNMP **Simple Network Management Protocol**. Always on, indicating that the built-in SNMP agent is working.

Mgmt **Management**. Blinks on at regular intervals as the SNMP agent is polled for updated information.

Pwr **Power**. Indicates the status of the power supply. It may remain off for a few seconds during the power-on self-test. It is normally on.

Fault **Fault**. Indicates that the switch has detected a problem. It may remain on for a few seconds during the power-on self-test. If this indicator blinks or remains lit after self-test, there is a problem with the switch.

See Chapter 3 for troubleshooting information.

Cabling Requirements

Incorrect cabling is often the cause of network configuration problems. It's important that you understand cabling requirements before connecting Fast Ethernet devices to the switch.

UTP requirements

The 100BASE-TX Fast Ethernet specification requires you use Category 5 (CAT5) unshielded twisted-pair (UTP) cabling to operate at 100 Mbps per second. If you use lower grade cabling (CAT3 or CAT4), you'll get a connection, but will soon experience data loss or slow performance.

You're limited to 100 meters between any two devices with UTP cable. However, you can extend the total diameter by installing a fiber optic media adapter and using fiber optic connections between switches, or between the switch and a router or bridge.

See pages 10–11 if you're unsure whether your network topology meets these distance limitations.

Fiber optic requirements

The optional 100BASE-FX fiber optic media adapter (Intel product code ESMODFX) lets you use multimode fiber optic cable to connect two switches, or to connect the switch with a router or bridge. The media adapter uses an SC fiber optic connector.

With multimode fiber optic cable, signals can travel up to 412 meters with no repeater when the link is configured at half duplex. If configured at full duplex, the signal can travel up to 2 km.

Straight-through vs. crossover cables

Ports on the switch are wired MDI so you can use a straight-through cable when connecting to a Fast Ethernet repeating hub port, which is usually wired MDI-X. For direct connection to another MDI port (workstation, server, or another switch), you must use a crossover cable. The pinouts of MDI and MDI-X ports are shown below.

Connector pinouts

NOTE
When making your own cables, wires 1 and 2 must be a twisted pair and 3 and 6 must be a twisted pair.

Switch or NIC RJ-45 (MDI)		Hub RJ-45 (MDI-X)	
1	TX+	1	RX+
2	TX-	2	RX-
3	RX+	3	TX+
4	Unused	4	Unused
5	Unused	5	Unused
6	RX-	6	TX-
7	Unused	7	Unused
8	Unused	8	Unused

Determining which cable to use

Different switch and repeater manufacturers implement their port configurations differently. The following guidelines are based on the Intel Express 100BASE-TX Switching Hub (switch), the Intel Express 100BASE-TX Stackable Hub (repeater) and the EtherExpress™ family of adapters (server or workstation). These apply to the majority of switches and hubs:

For this connection	Use this cable
Switch to repeater	Straight-through
Switch to server or workstation	Crossover
Switch to switch	Crossover
Repeater to server or workstation	Straight-through

Typical Configurations

Configuring the 100 Mbps workgroup environment

In the 100 Mbps environment, workgroup clients should be connected to a 100 Mbps hub such as the Intel Express 100BASE-TX Stackable Hub. All hub stacks should be connected to the Express Switching Hub. By connecting the hubs to a switching environment, you can extend Fast Ethernet distance limitations.

Dedicated 100 Mbps link to file server

Crossover cable

Straight-through cable

Straight-through cable

Segment 1

Segment 2

Intel Express 100BASE-TX Stackable Hubs

Straight-through cables

100 Mbps clients using Intel EtherExpress™ PRO/100 adapters

100 Mbps clients using Intel EtherExpress PRO/100 adapters

CAT5 UTP (100 meters max.)
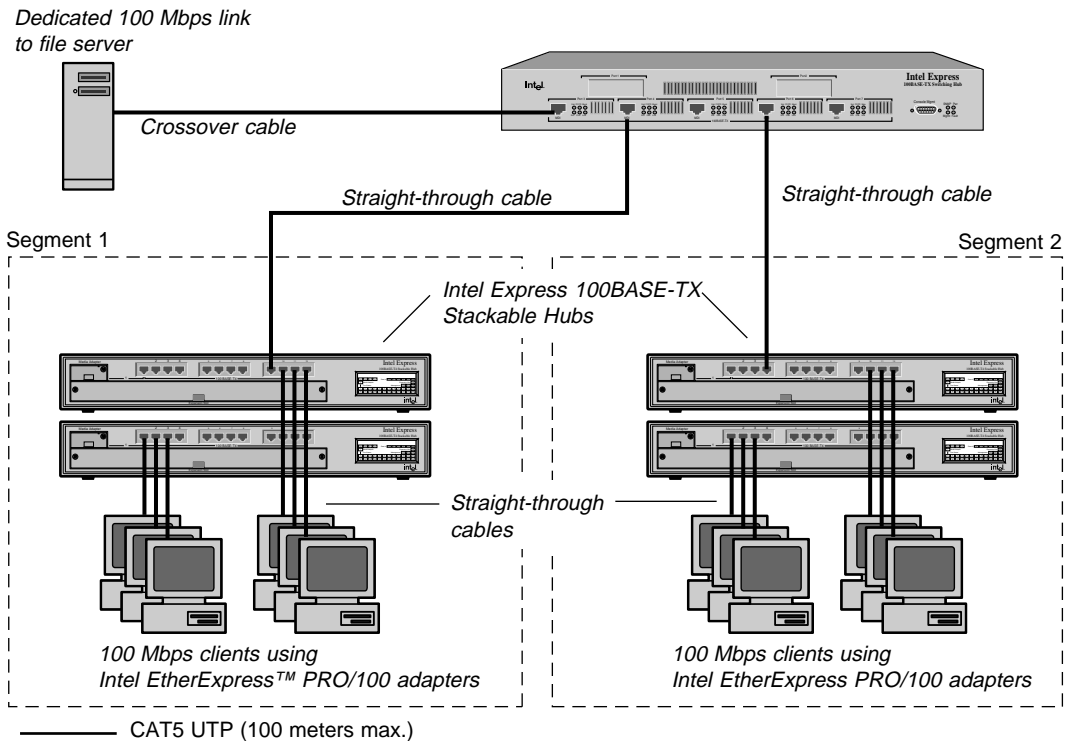
Configuring the Wide Area Network (WAN) environment

Connections to the backbone are most effective using fiber optic cabling. This eliminates the 100 meter UTP restriction. Also, connect multiple switches directly to the backbone (not each other) and connect busy servers directly to the switch.

Intel Express 100BASE-TX Stackable Hubs

High speed 100 Mbps servers

CAT5 UTP (100 meters max.)
Multimode fiber (412 meters max. at half duplex, 2 Km max. at full duplex)
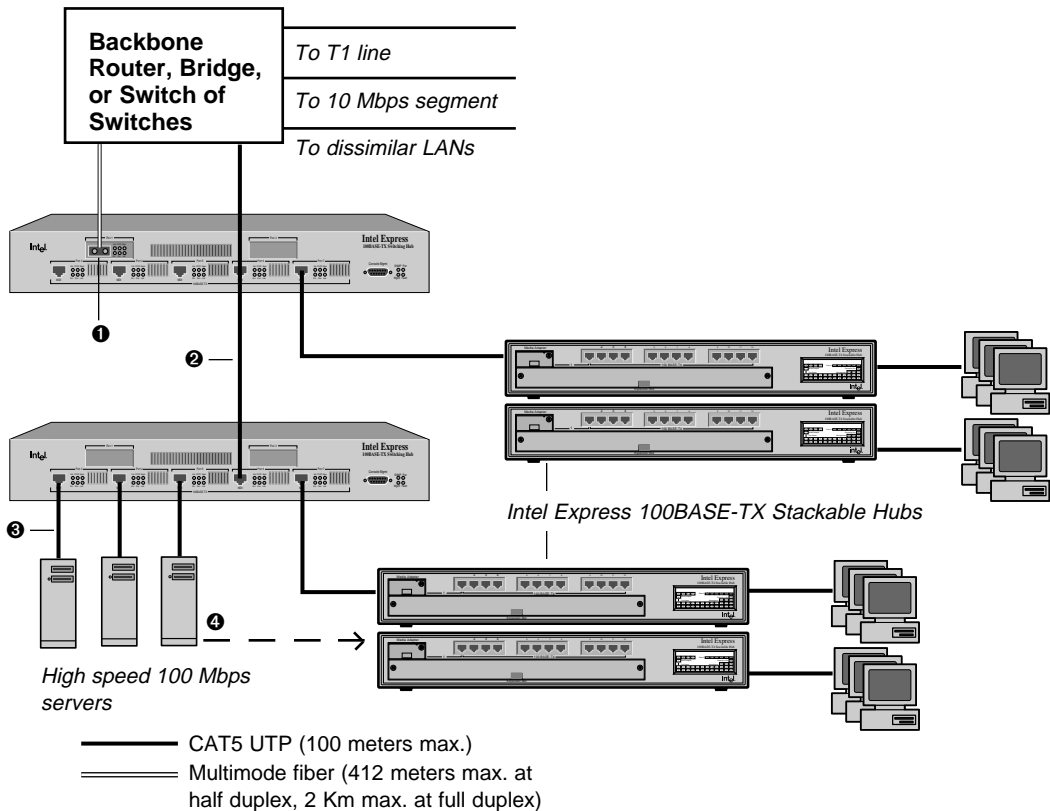
NOTES

❶ 100BASE-FX Fiber optic media adapter optional (product code ESMODFX).

❷ You can also use CAT5 UTP to connect to a backbone router or bridge.

❸ Configure high-speed servers for full duplex to achieve 200 Mbps throughput.

❹ If a server isn't accessed by more than one segment, move it to a hub on the segment.

Connecting to a 10 Mbps segment

The Express Switching Hub is a 100 Mbps-only switch. You can't connect a 10 Mbps device directly to the switch.

The preferred way to connect the segments is by using a bridge, router, or a 100 Mbps uplink module for your 10 Mbps hub (there isn't a 10 Mbps uplink module available for the Express switching hub). However, this is costly if you don't already have the equipment. An inexpensive alternative is to connect the segments through a server.

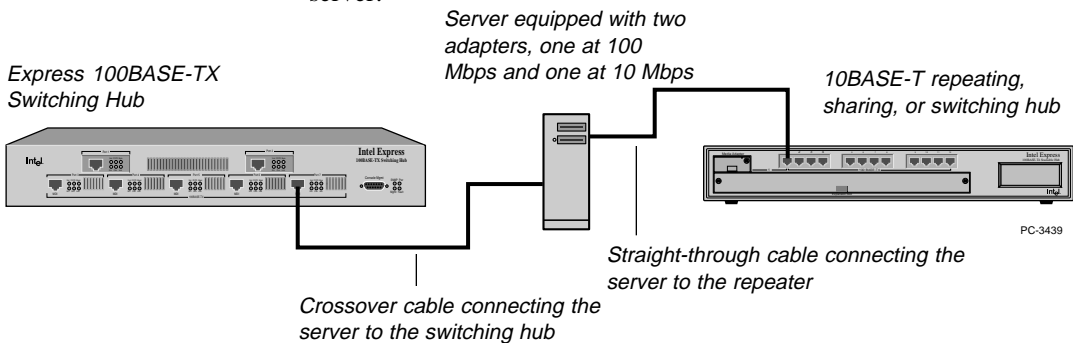*Server equipped with two adapters, one at 100 Mbps and one at 10 Mbps*

Express 100BASE-TX Switching Hub

10BASE-T repeating, sharing, or switching hub

PC-3439

Straight-through cable connecting the server to the repeater

Crossover cable connecting the server to the switching hub

Several adapters on the market (such as the Intel EtherExpress PRO/ 100 adapter) operate at either 10 or 100 Mbps. By connecting the Express 100BASE-TX Switching Hub to one server adapter at 100 Mbps and your 10BASE-T hub to a separate adapter at 10 Mbps in the same server, you can route traffic from the 10 Mbps segment to the 100 Mbps segment through your Network Operating System (NOS).

If your NOS doesn't support multi-protocol routing (Windows 95 peer-to-peer and Windows for Workgroups* don't), you must use a Fast Ethernet switch or router that supports both 10 Mbps and 100 Mbps.

Excessive flow control problems

During times of peak network usage, you may occasionally see the FC/FD LED blink (for a description of the LED, see page 6). This is normal. However, if it stays lit for more than a few seconds at a time, or if there's an excessive number of flow controls reported by the network management software, it could indicate a problem with your network configuration.

A port's FC/FD LED indicator flashes whenever a packet is received that needs to be forwarded to a port that already has too many packets queued. This indicates a temporary overload situation on one port; the total traffic to the port exceeds the amount the buffer can hold. This typically occurs when there are several fast machines on different ports trying to access a machine across the switch. If this is infrequent, you don't need to do anything. However, if this occurs often on the network, then the devices causing flow control to activate should be identified and moved to the same segment as the device that they are talking to.

When Ethernet bandwidth is temporarily insufficient for the traffic, there are only three possible actions: drop packets, use flow control, or segment the network. Buffering packets only works for a very short while. An extended overload will eventually overflow buffers and cause dropped packets. Flow control stops transmission on a port and forces devices to resend packets, ensuring that packets aren't lost. This is the most reasonable solution, since it relies on Ethernet's inherent collision detection mechanism to relieve temporary overload.

Repeater count limitations

The switch doesn't count as a repeater. Each port on the switch can support a full Fast Ethernet network. There can be one repeater/hub between the switch and any workstations or servers (a stack of Intel Express 100BASE-TX Hubs counts as a single hub). Also, the total diameter of a segment can't exceed 200 meters when using UTP cable. That is, the distance between any two nodes on a segment (or the switch and a node on the other side of a hub) can't exceed 200 meters.

2 Configuring and Managing the Switch

You don't need to read this chapter unless you want to change the Express Switching Hub's default configuration (see Appendix A for a list of defaults) or intend to manage the switch. The switch is ready to go simply by plugging it in and turning the power on.

However, if you need to change the default configuration or manage the switch, there are two ways:

- Use SNMP-compliant management software (not included). However, you must first use the Console Manager to assign an IP address to the switch.

- Use the Express Switching Hub's internal Console Manager.

Accessing the Console Manager

The Console Manager software is contained in the switch's nonvolatile RAM (NVRAM); you don't need to install any software. To access the Console Manager:

1   Use the null-modem cable (included with the switch) to connect a workstation's COM port to the Console Mgmt port on the switch.

Console Mgmt
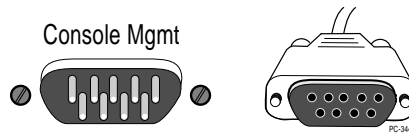
2   Open a terminal emulation program (such as Windows Terminal).

3   Select the COM port and these communication parameters:

9600 baud, eight data bits, no parity, one stop bit

In Windows Terminal, choose Communications from the Setting menu.

4   Press ⏎ Enter. The login prompt appears:

```
Login:
password:
```

By default, no login name or password is assigned. The password you enter becomes active only after you reset the switch or turn off the power. If you want the password to take effect immediately, use the set-passwd command.

Accessing the Console Manager remotely

To access remotely through Telnet, you must first set the IP configuration of the switch using the set-ip-conf command (see page 32 for instructions). You can then use Telnet to reach the switch.

In a remote session, all commands work exactly as if a terminal were directly connected to the Console Mgmt port. Note that only one console session can be active at a time. After the first Telnet session is established, the switch refuses other Telnet connections until the current session is closed. To terminate an active Telnet session, press ⏎ Enter three times from the serial interface.

Using the Console Manager

The Console Manager provides an out-of-band (not on the network) connection to the switch. Use the Console Manager to

- assign an IP configuration to the switch.
- configure the ports.
- monitor network performance.
- create VLANs.

Entering commands

To enter commands, type the command name followed by any parameters and press ⏎Enter. For example, typing `sys-stat` ⏎Enter at the command prompt displays basic system status information.

Items in angle brackets represent values. For example, `<IPaddress>` represents an IP address in dotted decimal notation (such as 123.1.1.7).

Items in { } and separated by | represent alternatives for an argument. For example,

```
get-comm {read|write|*}
```

means you can type one of the following

```
get-comm read
get-comm write
get-comm *
```

If you enter a command incorrectly, a message indicates the type of error that occurred. For example, typing a nonexistent command gives the following message:

```
SYS_console> pin
command <pin> not found
```

If the command exists but the number of parameters is incorrect, the following message is displayed:

```
SYS_console> ping
 too few arguments
```

Commands sometimes have parameters that determine how they're saved and when they're implemented. Some are changed in

• the running database so that the new value is used immediately (the `run` option).

• the NVRAM so that the changes are saved and occur only in the next session (the `nvram` option).

• both the running and the NVRAM databases (the `all` option).

To get an explanation of a command's parameters, add a question mark (?) after the command name:

```
SYS_console> set-lt-age ?
set-lt-age     sets the LT aging period
   [arg #0]  database type - either {run|nvram|all}
   [arg #1]  aging time in seconds
```

The Console Manager provides a history of the last several commands. To obtain the last command in the command history, press ⏎ or
Ctrl P at the prompt.

To correct a command line, use the following special keys (see the `help-kbd` command):

• ! or Ctrl P   - for the previous command

• Ctrl W   - to delete the previous word

• Ctrl U   - to delete the entire line

When you type a command that results in more than one screen of text appearing, you can press Q to stop the process or any other key to continue to the next screen.

Finally, you can press Tab⇆ to see the list of commands that start with the text already typed. For example:

```
SYS_console> get-c Tab⇆

               Commands matching <get-c>

-------------------------------------------------

get-comm       show current read or/and write community

get-con-matrix displays the VLAN connectivity matrix

get-colls-cnt  gets the collision distribution counters per port
```

Console Manager command groups

The Console Manager has several categories of commands:

- **Console commands**: help, banner, serial line setup, console parameters setup.
- **System commands**: system status, reset commands, download commands, and system debug commands.
- **IP commands**: IP address setup, parameter and information display.
- **SNMP agent commands**: SNMP settings, management, and trap options.
- **Switching database commands**: aging time management and switching database entry management.
- **Spanning tree commands:** disabling or manually configuring the spanning tree protocol.
- **VLAN commands:** management of security virtual LANs.
- **Port configuration commands:** duplex and other port settings.
- **Switching statistics commands:** traffic and packet counters.

The following sections explain some of the more commonly used commands for configuring ports and monitoring traffic statistics.

Configuring a port for full duplex

Commands used

`set-port-dplex`   Sets the duplex mode on the specified port.

`get-port-cfg`   Displays the current port configurations.

Configuring a port for full duplex allows the switch to send and receive packets simultaneously with the destination device. To establish a full-duplex link, both the switch and the destination device must be configured for full duplex.

Additionally, the link must be to a switch, workstation, or server. You cannot establish a full-duplex link to a device that broadcasts incoming packets to every port on the device. This excludes most shared hubs, repeaters, or concentrators.

NOTE
Setting a port to full duplex automatically disables flow control. Since collisions don't happen on a full-duplex link, flow control isn't needed.

You must have a point-to-point connection to establish a full-duplex connection (shared hubs/repeaters/concentrators aren't capable of full duplex). Additionally, both points of the connection must be configured for full duplex.

To configure a port for full duplex

1 Configure the adapter or switch port on the other end for full duplex.

2 Set the Express Switching Hub port to full duplex. This example sets port 3 to full duplex:

```
set-port-dplex 3 full
```

3 Check the FC/FD LED. It should be solid yellow, indicating full duplex.

Configuring the SNMP agent for IP

Commands used

set-ip-conf   Sets IP address, netmask, and broadcast address.

ping   Contacts another IP device.

The switch can be monitored and controlled through any SNMP-compliant network management system (NMS). First, you must configure the SNMP agent by assigning an IP address.

To configure the SNMP agent

1 Set the IP configuration. Type the command:

```
set-ip-conf 192.1.1.64 255.255.255.0 192.1.1.255
```

If the switch doesn't have an IP address, then the specified IP configuration is changed immediately and saved in NVRAM.

If the switch is already configured, the command changes only the NVRAM. To use the new parameters, reset the switch using the warm-reset command.

2 Test the installation. Type the command:

```
SYS_console> ping 192.1.1.1 2
```

This example tests connectivity from the switch to a workstation with an IP address of 192.1.1.1. For more information on the ping command, see page 33.

3 Download the MIB from Intel's Customer Support World Wide Web site (http://www-cs.intel.com). The file is compressed in the file SWCH1MIB.EXE.

4 Compile the MIB into your NMS. See your NMS documentation for more information.

Monitoring traffic

Commands used

`get-br-cnt`	Displays the packet statistics for a port. For a complete description, see page 52.
`get-eth-cnt`	Displays the Ethernet counters for a port.
`get-colls-cnt`	Displays the collision distribution counters for a port.
`get-rmon-cnt`	Displays the Ethernet RMON counters for a port.
`get-sdist-cnt`	Displays the packet size distribution counters for a port.
`get-mgm-brcnt`	Displays the statistics for the management port.
`clr-cnt`	Resets the Ethernet and bridging statistics.

Use monitoring commands to determine the traffic volume from specific ports or between ports. This allows you to determine the traffic patterns of your network and adjust your network topology for maximum efficiency.

Statistics are generated for the current session. Reset counters by using the `clr-cnt` command, resetting the switch, or cycling the power.

In general, keep devices that primarily talk to each other on the same segment (remember, each port is a Fast Ethernet segment). For example, if a high volume of traffic is forwarded from port 4 to port 3, determine which devices are generating traffic and move them to the same segment. This often happens when users are accessing a server on a separate segment. A change may not be efficient, however, if users from several segments all access the same server frequently.

To check traffic on a port

1 Determine the port you want to check.

2 Type the command:

```
SYS_console> get-br-cnt 3
 Ethernet Switching Counters for port 3
 ===================================================
 Frm   Received OK :   1419681
 Bytes Received    : 842637991
 Frm Filtered      :         0
```

```
Frm to all ports  :          0
Frm multicast     :      16017
Frm lost/fctrl    :          0
Transmit OK       :    1404387
Forward to port   :     FRAMES              BYTES
----------------------------------------------------
      1           :           0                 0
      2           :           0                 0
      3           :   218103808                60
      4           :     1419823         842711315
      5           :           0                 0
      6           :           0                 0
      7           :           0                 0
====================================================
```

In this example, a station on port 3 is accessing a server on port 4. To reduce the amount of traffic crossing the switch, the server should be connected to a hub on port 3 instead of a hub on port 4. This keeps traffic localized to the same Fast Ethernet segment.

Creating VLANs

Commands used

set-vbc-domain   Sets up a Virtual Broadcast Domain (VBD).

del-vbc-domain   Deletes a VBD.

get-vbc-tbl   Displays the VBD table.

set-sec-vlan   Sets up a security VLAN.

del-sec-vlan   Deletes a security VLAN.

get-svlan-tbl   Displays the security VLAN table.

There are two types of VLANs:

- **Security VLANs (SVLANs)**. Ports in an SVLAN can exchange packets only with other ports in the same SVLAN.
- **VBDs**: Ports in a virtual broadcast domain can exchange packets only with other ports in the same VBD. However, they can see broadcast frames from other ports in the same VBD.

Use only one type. Configuring both types in the same switch can lead to unpredictable traffic patterns.

If you want a device to talk to multiple VLANs (for example, a management workstation), apply a custom filter to the device. See for instructions.

To create an SVLAN

1 Determine the ports you want to group together.

2 Type the command:

```
set-sec-vlan all 3-4-5
```

This command groups port 3, 4, and 5 as an SVLAN immediately and saves the entry in NVRAM. Replace all with nvram to save the entry without changing it immediately or with run to change the entry now without saving it.

3 To display a summary of saved SVLANs, type

```
get-svlan-tbl nvram
```

Any SVLANs created with the nvram or all option are displayed.

To create a VBD

1 Determine the ports you want to group together.

2 Type the command:

```
set-vbc-domain run 3-5-6-7
```

This command groups port 3, 5, 6, and 7 as a VBD temporarily (only until the next reset or power down). To save the entry and have it take effect now, replace run with all.

3 To display a summary of saved VBDs, type

```
get-vbc-tbl nvram
```

Configuring the spanning tree

Commands used

`get-stp`	Displays the spanning tree session state.
`set-stp`	Enables or disables the spanning tree for the next session.
`get-st-bcfg`	Displays the spanning tree bridge parameters.
`get-st-pcfg`	Displays the spanning tree port parameters table.
`get-st-syscfg`	Displays the spanning tree system ports configuration.
`set-br-prio`	Sets the spanning tree bridge priority.
`set-br-maxage`	Sets the spanning tree bridge maximum age.
`set-br-hellot`	Sets the spanning tree bridge hello time.
`set-br-fwdel`	Sets the spanning tree bridge forward delay.
`set-prt-prio`	Sets the spanning tree port priority.
`set-prt-enb`	Enables or disables a port spanning tree.
`set-prt-pcost`	Sets the spanning tree port path cost.

Spanning tree is a protocol that determines which port is turned off in a redundant configuration. Spanning tree is enabled anytime a packet could potentially be caught in an infinite loop on the network (for example, when two switches are connected to each other and also to the same bridge). The protocol uses the port with the lowest-cost path and turns off the other port. If one path fails, the other path is automatically turned on.

Spanning tree is enabled by default. See the "Spanning tree commands" section later in this chapter for more information.

Creating custom filters

Commands used

`add-cf-entry`	Adds a custom filter entry.
`del-cf-entry`	Deletes a custom filter entry.
`get-lt-filter`	Displays the filter for a given MAC address.
`get-nv-cftbl`	Displays all configured custom filters.

Use custom filters to control where the switch forwards packets from a given MAC address. Custom filters override VLANs. This is useful when you want a device to talk to devices outside of its VLAN.

Filters are defined for a set of ports. For example, you can set a custom filter that tells the switch to forward packets received on ports 3 and 4 to ports 6 and 7.

To set a custom filter

1 Determine the MAC address of the device you're applying the filter to.

2 Determine the switch ports where the device's packets will arrive. These are the source ports.

3 Determine the switch ports where the device's packets will be forwarded. These are the destination ports.

4 Use the Custom Filter Port Tables in Appendix A to find the source and destination port hexadecimal equivalents.

5 Type the command:

```
add-cf-entry perm 00-A0-C9-11-11-11 C C0
```

This custom filter would send packets from the device with MAC address 00-A0-00-11-11-11 arriving on ports 3 or 4 (hexadecimal C) to both ports 6 and 7 (hexadecimal C0).

NOTE
Source ports start with port 1. Destination ports start with port 0, which is the internal SNMP management port.

Console Command Reference

The console commands configure the Console Manager parameters and interface.

Type ? at the Console Manager prompt to display a list of available command topics and a short explanation of each. Type a name from this list to display the commands under that topic.

```
SYS_console> ?

        Commands groups are:
-------------------------------------------------
console        Console related commands
system         System related commands
ip             IP related commands
snmp           SNMP related commands
switch-db      Switching Database related commands
vlan           Virtual LANS related commands
port-cfg       Port Configuration related commands
statistics     Switching Statistics related commands
sp-tree        Spanning Tree related commands
-----------------------------------------------------------
use ! for prev. cmd, ^U to clr line, ^W to clr previous word
-----------------------------------------------------------
```

When you find the command you need from one of these categories, type the command followed by ? for a description of command syntax.

help-kbd

Lists the console function keys.

```
SYS_console> help-kbd
 ? or TAB -  for a list of the categories
 ! or ^P  -  for previous command
 TAB      -  for command completion
 ^U       -  to clear the line
 ^W       -  to clear the previous word
```

banner

Displays the Express Switching Hub Console Manager logo.

clear

Clears the screen and displays the command prompt.

login

Exits the Console Manager, but does not disconnect a Telnet session. Use this command to password protect the console terminal while a Telnet session is running.

logout

Ends the local Console Manager session and any Telnet session and displays the login prompt for a new session.

set-prompt

```
set-prompt <new_prompt>
```

Sets the command-line prompt for the Console Manager to a more meaningful prompt, such as the location of the switch or the name of a workgroup. The default prompt is SYS_console>.

```
SYS_console> set-prompt R&D_grp>

 CLI prompt change in the NVRAM OK

R&D_grp>
```

set-passwd

Changes the console password. The system first prompts you for the old password. You can then type a new password and type it again for verification. Passwords are never shown onscreen.

```
SYS_console> set-passwd
Enter old password:
Enter new password:
Enter new password again:
 CLI running password changed
 CLI password change in NVRAM OK
Password changed!
```

If you enter the old password incorrectly or fail to verify the new password correctly, the password isn't changed.

System commands

The system commands allow you to display and set system-related parameters.

sys-stat

Displays general status information about the switch and its SNMP agent hardware and software:

```
SYS_console>sys-stat
   Intel Express Switching Hub
   SNMP Agent Software  - Version V2.2 Nov  7 1995 15:01:09
   SNMP Object ID is : < .1.3.6.1.4.1.629.1.1.3 >
   System MAC Address :  00-A0-C9-00-20-D9
   Total uptime(hundredths of seconds ): 111151888
   Total uptime(days, hh:mm:ss format): 12 days, 20:45:18.88
i/f 1 -- description [ Port 1 - missing ] —- status [DOWN]
i/f 2 -- description [ Port 2 - missing ] —- status [DOWN]
i/f 3 -- description [ Port 3 - 100 BaseTX Ethernet Port] -- status [up]
i/f 4 -- description [ Port 4 - 100 BaseTX Ethernet Port] -- status [up]
i/f 5 -- description [ Port 5 - 100 BaseTX Ethernet Port] -- status [up]
i/f 6 -- description [ Port 6 - 100 BaseTX Ethernet Port] -- status [up]
i/f 7 -- description [ Port 7 - 100 BaseTX Ethernet Port] -- status [up]
```

The screen displays the following information:

• SNMP agent software version and release date.

• Device SNMP object ID

• Device MAC address.

• System uptime (in 1/100 of a second) and in days, hours, minutes, and seconds.

• Port description and status. Ports 1 and 2 appear as missing unless you have optional media adapters installed.

warm-reset

Resets the SNMP agent software without resetting the switch (it doesn't disconnect existing connections). The switch configuration is loaded from the values saved in NVRAM. The statistics counters are also reset by this command.

cold-reset

Performs a cold reset, which is equivalent to turning the power off and on again. Existing connections are also lost.

get-last-err

Displays the most recent system failure, if any, for diagnostic purposes.

```
SYS_console>get-last-err
 System information since the last hardware reset
 ————————————————————
 Software resets number : 0
The system never encountered a fatal error
SYS_console>
```

init-nvram

Resets the NVRAM on the SNMP agent to default values. Changes don't take effect until you use the `warm-reset` or `cold-reset` commands or cycle the power. Default values are listed in Appendix A.

set-line-slip

```
set-line-slip {9600|19200|38400}
```

Changes the console serial port to SLIP mode for out-of-band SNMP management. The argument to the command is the new baud rate for the interface. SLIP can be used with a terminal server but not with a modem. The SLIP interface can be configured using the `set-slip-conf` console command. The serial port can be returned to console mode by pressing ⏎ Enter three consecutive times from a terminal.

set-sw-file

```
set-sw-file <filename>
```

Sets the name of the file downloaded by TFTP (trivial file transfer protocol). This command is used in case of an update to the switch's firmware. The file name must match the name of the agent software file on a TFTP server. When TFTP is used, the per-packet retransmission time-out value on the server (not the switch) must be increased to 10 seconds, since the SNMP agent must first erase its flash EEPROM, which takes about 30 seconds.

set-par-file

```
set-par-file <filename>
```

Sets the name of the SNMP agent parameter file downloaded by boot PROM (BOOTP). This filename must match the name of the parameter file on the BOOTP server. The format of the parameter file is:

```
<switch_hardware_address> : <read_comm> : <write_comm>
```

Example:

```
00-A0-C9-00-01-23 : public : private
```

set-fg-param

```
set-fg-param <dest> <source> <fill_byte> <length>
```

Sets the frame generator parameters. The `dest` and `source` are dash-separated hardware addresses in hex. The `fill_byte` is a single byte used to fill the entire packet except for the first 12 bytes. The `length` is the total length of the packet excluding CRC.

start-fg

```
start-fg <dport-bitmask> <count> <rate>
```

Starts frame generation. `dport-bitmask` is a hex bitmask of which ports to generate traffic on. For example, a `dport-bitmask` of 3E sends frames to ports 2, 3, 4, 5, 6. Use the source port list on page 68 for hexadecimal bitmask equivalents. The `count` specifies the number of frames to send on each port. A count of 0 sends packets until you type the `stop-fg` command. The `rate` specifies the number of packets per second to generate.

stop-fg

Stops the frame generator.

IP commands

This section lists the IP commands available from the command line interface. In the sections that follow, IP Configuration lists general configuration commands, Ping lists commands that describe the ping ability of the agent, and Address Resolution Protocol lists ARP commands.

IP Configuration

get-ip

Shows the switch's current IP address:

```
SYS_console> get-ip
 The device IP address is: 129.001.001.064
SYS_console> _
```

If the switch doesn't have an IP address assigned:

```
SYS_console> get-ip
 The device has no IP address defined.
```

get-ip-conf

Shows the complete current IP configuration: IP address, netmask (subnet mask), and broadcast address.

```
SYS_console> get-ip-conf
 The device has no IP Address defined
SYS_console> get-ip-conf
 The device IP address, netmask and broadcast are:
          IP address   : 129.001.001.064
          IP netmask   : 255.255.000.000
          IP broadcast : 129.001.001.000
```

NOTE

If the IP configuration is not specified, the agent will not respond to any in-band requests, including ping messages and network management applications.

set-ip

```
set-ip <IPaddress>
```

Sets the IP address of the switch (technically, the switch's SNMP agent). If no IP address was previously set (which is the default configuration), the new value is used immediately and saved in NVRAM. Otherwise, the new value is stored in NVRAM, but you must use the warm-reset command or cycle the power for changes to take effect.

Example:

```
set-ip 129.001.001.064
 Device IP Address unchanged for this session
 Device IP Address change in the NVRAM OK

 The device NVRAM IP address will be:
          IP address   : 129.001.001.064
```

set-ip-conf

```
set-ip-conf <IPaddress> <netmask> <broadcast>
```

Sets IP address, netmask (subnet mask) and broadcast IP address. If no IP configuration was previously set (which is the default configuration), the new values are used immediately and saved in NVRAM. If a previous IP configuration was being used, the new configuration is saved in NVRAM for the next session. To use the new values immediately, use the `warm-reset` command or cycle the power.

```
SYS_console> set-ip-conf 129.1.1.64 255.255.0.0 129.1.1.0
 Device IP Address set for this session
 Device IP Address change in the NVRAM OK
 The device IP configuration in the next session will be:
          IP address  : 129.001.001.064
          IP netmask  : 255.255.000.000
          IP broadcast : 129.001.001.000
```

get-bootp

Displays the current state of the BOOTP process. By default, BOOTP is disabled.

set-bootp

```
set-bootp {enable|disable}
```

Enables or disables BOOTP. With BOOTP, the switch looks for a BOOTP server at startup if no IP configuration is defined.

get-slip

Displays the current SLIP address. By default, no SLIP address is assigned.

get-slip-conf

Displays the current SLIP configuration.

set-slip

```
set-slip <IPaddress>
```

Sets the SLIP address, which cannot be the same as the IP address.

set-slip-conf

```
set-slip-conf <IPaddress> <netmask> <broadcast>
```

Sets the SLIP configuration. The arguments are the same as `set-ip-conf` earlier on this page.

get-gatew

Shows the default gateway. This is the default router to use when accessing a different IP network.

set-gatew

```
set-gatew <IPaddress>
```

Sets the default gateway IP address, which specifies the router used to access a different IP network. The default value for this setting is 0.0.0.0 (no gateway).

```
SYS_console> set-gatew 129.1.1.1
 Device Default Gateway change in the NVRAM OK
 Device Default Gateway changed to : 129.1.1.1
SYS_console> get-gatew
 Device default gateway address is: 129.001.001.001
```

get-def-ttl

Returns the default IP time to live (TTL) value. This value (from 1 to 255) is the number of routers a frame can go through before being dropped. The default is 10.

set-def-ttl

```
set-def-ttl <number>
```

Modifies the default TTL value, from 1 to 255 router hops allowed.

Ping commands

The `ping` command sends an Internet Control Message Protocol (ICMP) echo request packet to a station. The ping process is asynchronous, so any responses are mixed in with other system console messages. For this reason, it's best to avoid typing other commands (except `ping-stop`, which cancels the ping) while the ping process is active.

ping

```
ping <IPaddress> {<number>|0}
```

Ping a device (at *IP address*) *number* of times or 0 for endless ping. The ping process sends a *number* of datagrams, one per second. One line of output appears for every response received. Normal response time is 1 to 10 seconds.

The ping command is intended for testing the connectivity between the switch and an IP station. It is not intended as a traffic generator, so it's best to avoid using an endless ping. To stop the ping, use Ctrl C or enter the `ping-stop` command.

```
SYS_console> ping 129.1.1.1 10
129.001.001.001 Alive. echo reply: id 297, seq 4, echo-data-len 8
PING process stopped - press <CR> for prompt
        — press <CR> to get the prompt again
```

If the host doesn't respond, the console prompt appears and no output is added. Failure to get an echo response from a host may be due to the following:

- A bad physical connection.

- A nonexistent or inactive host.

- network unreachable: no corresponding entry in the routing table.

- destination unreachable: the default gateway failed to route the datagram.

- outdated Address Resolution Protocol (ARP) table information: clear the ARP table with the `del-arp-entry` command.

If there's an active ping process due to a previous "long" ping command and you try to start a new ping, the command fails.

ping-stop

Stops the active ping process. You can also use Ctrl C.

Address Resolution Protocol (ARP) Commands

get-arp-tbl

Shows the ARP table. This table shows the port and MAC address for each IP address in the table.

```
SYS_console> get-arp-tbl

IfIndex     IpAddress             MAC Address

==================================================

    1       129.001.001.001       00-40-05-2D-73-9C

    1       129.001.001.200       00-02-A0-D4-9A-57
```

add-arp-entry

```
add-arp-entry <IPaddress> <mac_address> <port>
```

Adds an entry to the ARP table manually.

del-arp-entry

```
del-arp-entry {<IPaddress>|*}
```

Deletes entries from the ARP table. If you enter an IP address, the matching ARP entry is deleted. If you enter *, the entire ARP table is cleared. Use this command if the network topology has physically changed. For example, if a management station moves from one segment to another, its port number changes.

SNMP commands

This section lists commands for configuring the SNMP agent itself, access and trap configuration.

SNMP community strings

SNMP community strings authenticate access to the Management Information Base (MIB). Community strings function as "passwords" embedded in every SNMP packet. The community string must match one of the two community strings configured in the switch for the message to be processed. There are two community strings, one for each of the following type of access:

- `read` mode gives read access to all the objects in the MIB, but doesn't allow write access.

- `write` mode gives read and write access to all objects in the MIB.

get-comm

```
get-comm {read|write|*}
```

Displays the SNMP community string for a given access mode (read or write). If the access mode is specified as *, both read and write community strings are displayed.

```
SYS_console> get-comm *
 Current read community is: < public >

 Current write community is: < private >
```

set-comm

```
set-comm {read|write} <community-string>
```

Specifies the SNMP community string for each of the two access modes (read and write).

```
SYS_console> set-comm write password

New write community is: < password >
```

SNMP trap message commands

When the switch detects an irregular event, it generates a trap. A trap is a notification message that can be sent to predefined network management stations. A trap event can be a cold or warm reset, detection of a port link status change, an SNMP authentication failure due to an incorrect community string, or similar event.

The SNMP trap commands let you specify

- whether the Express Switching Hub issues an authentication trap.
- which NMSs (up to five) the SNMP agent sends traps to.

get-auth

Displays the authentication trap setting. By default, authentication trap messages are enabled.

set-auth

```
set-auth {on|off}
```

Changes the authentication trap setting. The default is `on`, meaning the switch generates authentication traps. Specifying `off` prevents the switch from sending authentication traps.

get-traps

Displays the list of traps receiving stations (their IP address and trap SNMP community string).

```
SYS_console>get-traps

          SNMP TRAP TABLE
          ===============
   IPADDR                        COMMUNITY
---------------------------------------------
 192.168.001.065   ————    testing
---------------------------------------------
```

add-trap

```
add-trap <IPaddress> <trap-community>
```

Enters the IP address of the receiving station and the trap community string that appears in the trap message. The trap table can contain up to five receiving stations

```
SYS_console> add-trap 129.1.1.76 rnd

 Entry 129.1.1.76 - rnd added
           SNMP TRAP TABLE
           ===============
    IPADDR                        COMMUNITY
-----------------------------------------------
 129.001.001.065   -----------   public
 129.001.001.007   -----------   trapcomm
 129.001.001.076   -----------   rnd
-----------------------------------------------
```

del-trap

```
del-trap <IPaddress>
```

Removes a station from the trap table.

```
SYS_console> del-trap 129.1.1.7

 Entry 129.1.1.7 - trap comm deleted
```

Switching database commands

This section contains instructions for managing the switching database with the Console Manager.

The switching database, also called a *learn table* or *address table*, consists of 1024 entries. Each active entry contains the information relevant to a network node, identified by its Ethernet MAC address. Each entry contains the following information:

Lock. If on (denoted as a +), the entry is a static entry and isn't deleted by the switch aging process. If off (denoted as a -), the entry is a dynamic entry that's automatically deleted if the workstation is not active during the aging time period.

Self **(not user configurable).** If on (denoted as a +), the entry is a system address. These are the switch's individual and group addresses, as well as other addresses added by the management system. If off (denoted as a -), the entry contains the MAC address of a station on the network.

Dport. The destination port where frames from the entry are forwarded. If the MAC address is a custom filter, this doesn't apply.

Mgmt. If on (denoted as a +), frames from the entry are sent to the management port on the switch.

The first section, "Virtual addresses," lists commands relevant to standard MAC addresses (for example, determining the behavior of the switch when it sees a particular address). The second section, "Custom filtering," lists commands pertinent to the custom filtering capabilities of the switch.

Virtual addresses

get-lt-entry

```
get-lt-entry <index>
```

Displays the entry at *index* in the switching database. The index range is 1 to 1024.

```
SYS_console>get-lt-entry 19

 Entry    ⸺ MAC Address ⸺    LOCK    SELF    DPORT    MGMT
=============================================================
   19     00-20-C5-00-59-E6    –       –        5        –
```

The entry has these properties:

- The entry number is 19.
- The MAC address is 00-20-C5-00-59-E6.
- The entry is dynamic and will be aged out (lock is off).
- It's not a system address (self is off).
- Frames are forwarded to port 5 only.
- Frames are not forwarded to the management port (mgmt is off).

get-lt-16

```
get-lt-16 {<index>|*}
```

Displays 16 switching database entries starting at *index* (or * to continue from the last displayed index).

```
SYS_console>get-lt-16 10

 Entry  —— MAC Address ——  LOCK   SELF    DPORT     MGMT
===============================================================
   10    00-20-1A-20-20-D9    +      +       -CUSTOM FILTER-
   11    00-20-1A-24-20-D9    +      +       -CUSTOM FILTER-
   12    00-20-1A-28-20-D9    +      +       -CUSTOM FILTER-
   13    00-20-1A-2C-20-D9    +      +       -CUSTOM FILTER-
   14    00-20-1A-30-20-D9    +      +       -CUSTOM FILTER-
   15    00-20-1A-34-20-D9    +      +       -CUSTOM FILTER-
   16    00-20-1A-38-20-D9    +      +       -CUSTOM FILTER-
   17    FF-FF-FF-FF-FF-FF    +      -       -CUSTOM FILTER-
   18    00-40-05-2D-9D-49    -      -         3         -
   19    00-20-C5-00-59-E6    -      -         4         -
   20    00-00-92-94-01-54    -      -         1         -
   21    00-C0-1D-01-06-20    -      -         1         -
   22    00-40-05-2B-0A-26    -      -         5         -
   23    00-40-05-29-1E-DE    -      -         7         -
   24    00-40-05-2B-17-37    -      -         4         -
   25    08-00-20-76-72-89    -      -         2         -


SYS_console>get-lt-16 *

 Entry  —— MAC Address ——  LOCK   SELF    DPORT     MGMT
===============================================================
   26    00-40-05-11-06-AD    -      -         2         -
   27    00-40-05-2B-59-EA    -      -         3         -
   28    00-40-05-2D-99-3A    -      -         7         -
   29    00-40-05-16-80-7C    -      -         5         -
   30    00-00-C0-60-A7-B9    -      -         5         -
   31    00-40-05-1A-A1-69    -      -         5         -
   32    00-40-05-29-1E-EB    -      -         6         -
   33    00-40-05-2E-DF-15    -      -         5         -
   34    00-40-05-28-B4-1A    -      -         7         -
   35    00-40-05-2F-93-A7    -      -         4         -
   36    00-40-33-32-A6-58    -      -         6         -
   37    00-40-05-15-70-5E    -      -         5         -
   38    00-40-05-1A-A1-5F    -      -         1         -
   39    00-40-05-28-B7-2A    -      -         5         -
   40    00-40-05-2B-16-3D    -      -         2         -
   41    00-40-05-15-B6-83    -      -         4         -
```

NOTE

In the example, entries 10-17 are system entries and can't be deleted or modified.

Entries 18 and up are self-learned MAC addresses, as indicated by lock = OFF (-) and by self = OFF (-).

find-lt-addr

```
find-lt-addr <mac_address>
```

Searches for a MAC address in the switching database and displays its description, if found:

```
SYS_console>find-lt-addr 00-40-05-2B-16-3D

 Entry  ---- MAC Address ----  LOCK    SELF    DPORT    MGMT

================================================================

   40    00-40-05-2B-16-3D     -       -         3        -
```

del-lt-entry

```
del-lt-entry <index>
```

Deletes the specified switching database entry, using the entry number from the get-lt-16 command. If that entry number is not active, the command has no effect. Entries with the self field set (system addresses) cannot be deleted.

The del-lt-entry command is very powerful, allowing you to change the entire switching database with the exception of the system MAC addresses. Use it with caution.

```
SYS_console> del-lt-entry 15
 Deleting entry at index - 15 -  OK
```

del-lt-addr

```
del-lt-addr <mac_address>
```

Deletes the switching database entry that matches the specified MAC address.

```
SYS_console> del-lt-addr 00-40-05-2b-59-4c
 Deleting entry with MAC address - 00-40-05-2b-59-4c OK
```

The command fails if the MAC address isn't found in the switching database.

add-lt-entry

```
add-lt-entry <mac_address> {lock-off|lock-on} <dport>
```

Add an entry to the switching database. The lock setting is described at the beginning of this section. *dport* is the destination port number.

```
add-lt-entry 00-A0-C9-00-11-11 lock-off 3
```

This command sends packets from the device with MAC address 00-A0-C9-00-11-11 to port 3. lock-off means the entry is deleted if the device is inactive for 300 seconds (the default aging time).

get-lt-age

Displays the switching database aging time in seconds. This is the amount of time the switch stores a device's MAC address before clearing it from the database. An entry whose MAC address doesn't appear in the source field of an incoming packet for this period of time is discarded. The default is 300 seconds.

```
SYS_console> get-lt-age

 The running aging time is: 300 seconds
```

set-lt-age

```
set-lt-age {run|nvram|all} <aging_time>
```

Modifies the switching database aging time.

The *aging_time* is in seconds with a default of 300 seconds and a range of 1 to 55,000 seconds. Lower the time if the number of active workstations is larger than 1024.

```
SYS_console> set-lt-age run 280

 Aging Period update in the running database OK

SYS_console> set-lt-age all 100

 Aging Period update in NVRAM OK
 Aging Period update in the running database OK
```

Custom filtering

Custom filters are useful for ensuring that a device can reach other devices regardless of where the device is attached. For example, if you have a laptop computer that acts as a management station, you want to make sure you can reach your servers from any part of your network, even if some segments have security VLAN restrictions.

The custom filter entry for an address is shown onscreen as a matrix. The source (SRC) column lists the available source ports (1 through 7, where ports 1 and 2 may or may not be installed). The other columns each represent an available destination port. A + represents a forwarding path. In the example, each source port (except port 3, because ports don't forward frames to themselves) forwards frames to port 3.

```
SYS_console>get-lt-filter 00-40-05-2D-9D-49

18 00-40-05-2D-9D-49 LOCK_OFF SELF_OFF — VIRTUAL LAN ——-

SRC PORT to : MGMT  P1  P2  P3  P4  P5  P6  P7

===============================================

1               -   -   -   +   -   -   -   -
2               -   -   -   +   -   -   -   -
3               -   -   -   -   -   -   -   -
4               -   -   -   +   -   -   -   -
5               -   -   -   +   -   -   -   -
6               -   -   -   +   -   -   -   -
7               -   -   -   +   -   -   -   -
```

get-lt-filter

```
get-lt-filter <mac_address>
```

Displays the custom filter for the specified MAC address. See the example above.

add-cf-entry

```
add-cf-entry {lock-on|lock-off|perm} <mac_address> <sport> <dport>
```

Adds a custom filter entry for the specified MAC address. `lock-on` indicates the entry won't be aged out, but will be lost when the switch is reset. `lock-off` indicates the entry can be aged out normally. `perm` indicates the entry is written to NVRAM and restored on reset.

sport is a hexadecimal representation of incoming ports, and *dport* is a hexadecimal bitmask of representation of outgoing ports. Because bitmasks are difficult to determine, a list of numbers for every combination of source and destination ports is listed in Appendix A.

Packets arriving at the switch with the destination MAC address from any port specified in *sport* are transmitted to all ports specified in *dport*.

```
SYS_console> add-cf-entry perm 00-AA-00-11-11-11 C C0

 Add CF LT entry  OK

 CF Entry Update in NVRAM  OK
```

This custom filter sends packets with destination MAC address 00-AA-00-11-11-11 from port 3 or 4 (hexadecimal C) to ports 6 and 7 (hexadecimal C0).

del-cf-entry

```
del-cf-entry {run|nvram} <mac_address> <sport>
```

Deletes the custom filter entry for address *mac_address* from source port *sport*. Ports are deleted one at a time by entering the port number. run indicates that the entry is deleted only from the current running table. nvram indicates that the entry should be removed from the NVRAM as well as the current running table.

get-nv-cftbl

This command displays the custom filter table stored in NVRAM.

```
  NVRAM CUSTOM FILTERS TABLE
==============================

 Entry  ---- MAC Address ----
------------------------------
    1    00-00-00-11-11-11
```

get-nv-cfilt

```
get-nv-cfilt <mac_address>
```

Displays the custom filter associated with *mac_address* from the custom filter table stored in NVRAM.

VLAN commands

Use VLANs to limit the broadcast domain and establish security virtual LANs. See the procedure on page 22 on creating VLANs.

- *run* indicates that only the currently running configuration is changed. Changes are not restored after a reset.

- *nvram* indicates that only the configuration stored in NVRAM is changed. Changes do not take effect until a reset.

- *all* indicates that both the currently running configuration and the NVRAM configuration is changed. Changes take effect immediately and are restored after a reset.

get-con-matrix

Displays the current connectivity matrix for the switch. The first column is the source port. The other columns are destinations where frames from a given source port can be forwarded. Unlearned addresses (addresses that aren't in the switching database) are forwarded to all ports marked with a + in the source port's row. Learned addresses are forwarded to their destinations only if the destination is marked with a + in the source port's row. Ports don't need to be forwarded to themselves.

```
SYS_console> get-con-matrix

   VLAN CONNECTIVITY MATRIX
  =========================
SRC  PORT to :  P1  P2  P3  P4  P5  P6  P7
=========================================
    1           -   -   +   +   +   +   +
    2           +   -   +   +   +   +   +
    3           +   -   -   +   +   +   +
    4           +   -   +   -   +   +   +
    5           +   -   +   +   -   +   +
    6           +   -   +   +   +   -   +
    7           +   -   +   +   +   +   -
```

get-vbc-matrix

Displays the current broadcast domain matrix for the switch. See the get-con-matrix command above for a description of the resulting table. Here, only the broadcast address is affected.

```
        VBC CONNECTIVITY MATRIX
    ==========================
SRC  PORT to :  P1  P2  P3  P4  P5  P6  P7
==========================================
    1             -   -   +   +   +   +   +
    2             +   -   +   +   +   +   +
    3             +   -   -   +   +   +   +
    4             +   -   +   -   +   +   +
    5             +   -   +   +   -   +   +
    6             +   -   +   +   +   -   +
    7             +   -   +   +   +   +   -
```

set-vbc-domain

```
set-vbc-domain {run|nvram|all} <port_list>
```

Establishes a virtual broadcast domain (VBD). `port_list` is a dash-separated list of ports to group into a broadcast domain. For example:

```
set-vbc-domain all 2-5-6-7
```

This creates a VBD of ports 2, 5, 6, and 7.

del-vbc-domain

```
del-vbc-domain {run|nvram} <domain_id>
```

Deletes a virtual broadcast domain. Use the `get-vbc-tbl` command to see a list of domain ID numbers.

get-vbc-tbl

```
get-vbc-tbl {run|nvram}
```

Displays the list of defined virtual broadcast domains.

```
SYS_console> get-vbc-tbl run

 RUNTIME    VIRTUAL BROADCAST DOMAIN TABLE
=============================================

  VBC ID     P1  P2  P3  P4  P5  P6  P7
  =====================================
    1:        -   -   -   +   +   +   -
```

set-sec-vlan

```
set-sec-vlan {run|nvram|all} <port_list>
```

Establishes a Security Virtual LAN (SVLAN). Arguments are identical to `set-vbc-domain`. Ports in an SVLAN can exchange data only with other ports in the same SVLAN.

del-sec-vlan

```
del-sec-vlan {run|nvram} <lan_id>
```

Deletes the SVLAN specified by `lan_id`. use the `get-svlan-tbl` command to see these ID numbers.

get-svlan-tbl

```
get-svlan-tbl {run|nvram}
```

Shows the table of defined SVLANs.

```
SYS_console> get-svlan-tbl run

 RUNTIME    SECURITY VIRTUAL LANs TABLE
  ================================

  SVLAN ID   P1  P2  P3  P4  P5  P6  P7
  =====================================
    1:        +   -   +   -   +   -   -
    2:        +   +   -   -   -   -   +
```

set-mon-port

```
set-mon-port <port>
```

Sets the port to be monitored. `port` is the port number. All traffic from this port is duplicated, or mirrored, on the port specified by the `monitor` command.

monitor

```
monitor <port>
```

Sets the monitoring port. All traffic from the port specified by `set-mon-port` is duplicated on `port`.

stop-mon

Stops port monitoring.

Spanning tree commands

Spanning tree automatically configures a loop-free topology in a bridged environment. The spanning tree agent is implemented in conformance with the IEEE 802.1d standard. In most cases, the defaults work fine and you won't need to use these commands.

get-stp

Displays the current state of spanning tree (either enabled or disabled). By default, spanning tree is enabled in accordance with 802.1d.

set-stp

`set-stp {enable|disable}`

Enables or disables the spanning tree protocol. Enabled is the default. Enabling or disabling spanning tree doesn't take effect until the SNMP agent is reset (`warm-reset`, `cold-reset`, or turning the power off).

get-st-bcfg

Displays the spanning tree bridge parameters. If spanning tree is disabled, parameters aren't displayed.

get-st-pcfg

Displays the spanning tree port parameter table. If spanning tree is disabled, parameters aren't displayed.

get-st-syscfg

Displays the spanning tree state for all ports.

set-br-prio

`set-br-prio <priority>`

Sets the spanning tree bridge priority of the switch. `priority` is a number from 0 to 65535. This is equivalent to setting the MIB variable dot1dStpPriority (RFC 1493).

set-br-maxage

`set-br-maxage <maxage>`

Sets the spanning tree bridge maximum age. This is the amount of time between spanning tree configuration messages. `maxage` is in seconds, from 6 to 40. However, the corresponding MIB variable, dot1dStpBridgeMaxAge (RFC 1493), is in hundreths of seconds, ranging from 600 to 4000, and must be a multiple of 100.

set-br-hellot

```
set-br-hellot <hello_time>
```

Sets the spanning tree bridge hello time. `hello_time` is a number from 1 to 10 in seconds. However, the corresponding MIB variable, dot1dStpBridgeHelloTime (RFC 1493), is in hundreths of seconds ranging from 100 to 1000, and must be a multiple of 100.

```
SYS_console> set-br-hellot 2

 The Bridge Hello Time was changed
```

set-br-fwdel

```
set-br-fwdel <forward_delay>
```

Sets the spanning tree bridge forward delay. This controls the amount of time between the listening and forwarding spanning tree states, and is completely unrelated to the forwarding latency. `forward_delay` is in seconds, from 4 to 30. However, the corresponding MIB variable, dot1dStpBridgeForwardDelay (RFC 1493), is in hundreths of seconds from 400 to 3000, and must be a multiple of 100.

set-prt-prio

```
set-prt-prio <port_number> <port_priority>
```

Sets the spanning tree port priority. `port_number` is the decimal port number, and `port_priority` is a number from 1 to 255. This is equivalent to setting the MIB variable dot1dStpPortPriority (RFC 1493).

set-prt-enb

```
set-prt-enb <port_number> {enable|disable}
```

Enables or disables a port in the spanning tree. `port_number` is the port number. This is equivalent to setting the MIB variable dot1dStpPortEnable (RFC 1493).

set-prt-pcost

```
set-prt-pcost <port_number> <path_cost>
```

Sets the spanning tree port path cost. `port_number` is the port number, and `path_cost` is path cost from 1 to 65535. This is equivalent to setting the MIB variable dot1dStpPortPathCost (RFC 1493).

Port configuration commands

This section contains instructions for configuring and displaying port settings with the Console Manager.

get-port-cfg

Displays the current port configuration.

```
SYS_console>get-port-cfg

PORT_ID   LAN_TYPE  LINK  IF_TYPE  PORTSEL  FDPLX  FCTRL
 ========================================================
    1        NONE    ---- PORT NOT INSTALLED ----
    2        NONE    ---- PORT NOT INSTALLED ----
    3       ETH100X  OFF    TPFD      TP      OFF    ON
    4       ETH100X  OFF    TPFD      TP      OFF    ON
    5       ETH100X  OFF    TPFD      TP      OFF    ON
    6       ETH100X  OFF    TPFD      TP      OFF    ON
    7       ETH100X  OFF    TPFD      TP      OFF    ON
```

The command displays the following information for each port:

- LAN type: ETH100X indicates 100BASE-TX Fast Ethernet

- Link status: ON or OFF

- Physical interface type: TPFD indicates Twisted-pair (TP) Ethernet, Full Duplex (FD) capable

- Physical interface selected: TP for the Express Switching Hub

- Full duplex mode: ON or OFF (default)

- Flow control: ON or OFF. If you set a port to full duplex, flow control is automatically turned off (changes take effect after a reset). If you try to set flow control to ON while full duplex is selected, the Console Manager ignores the change on reset.

set-port-dplex

```
set-port-dplex <port_number> {half|full}
```

Specifies whether the given port is in full-duplex or half-duplex (standard Ethernet) mode. The default is half-duplex.

```
SYS_console> set-port-dplex 2 full
 Port configured in <full_duplex> mode
 Parameter change in NVRAM OK
```

set-port-fctrl

```
set-port-fctrl <port-number> {on|off}
```

Turns the flow control feature on or off for the specified port. The default is on.

If the port is in full-duplex mode, flow control is automatically off. If you try to set it to ON while full-duplex is enabled, the Console Manager ignores the change after a reset. Flow control or full duplex can be active, or neither, but not both.

```
SYS_console> set-port-fctrl 2 off
 Port 2 - flow control <off>
 Parameter change in NVRAM OK
```

Switching statistics commands

This section contains instructions for displaying switching statistics using the Console Manager. The following commands provide full physical layer information as well as interport switching statistics.

clr-cnt

Clears (resets) the Ethernet and bridging statistical counters.

get-eth-cnt

```
get-eth-cnt <port-number>
```

Displays the Ethernet Statistics Counters for port *port-number*. This is almost identical to the Ethernet-like Statistics Group of the Ethernet MIB.

```
SYS_console> get-eth-cnt 3
 Ethernet Statistics for port 3
 =================================
 Transmit    OK    :   1427908
 Underflow   Errors:       153
 Exces Coll  Errors:         0
 Exces Fctrl Errors:         0
 Receive     EOF   :   1443206
 Receive     OK    :   1443192
 Overflow    Errors:         2
 CRC         Errors:         9
 Alignment   Errors:         0
 Runt        Errors:         6
 Lost/Fctrl  Errors:         0
 Too Long    Errors:         0
 =================================
```

get-colls-cnt

```
get-colls-cnt <port-number>
```

Displays the Ethernet collision statistics for each port. This is nearly identical to the Ethernet-like collisions statistics group of the Ethernet MIB and shows the collision count distribution for this port. If a packet still collides on the 16th count, the packet is retransmitted.

```
SYS_console> get-colls-cnt 1

 Ethernet Collision Distribution for port 1
 ==================================================
  1 collision count :     2234
  2 collision count :      121
  3 collision count :        0
  4 collision count :        0
  5 collision count :        0
  6 collision count :        0
  7 collision count :        0
  8 collision count :        0
  9 collision count :        0
 10 collision count :        0
 11 collision count :        0
 12 collision count :        0
 13 collision count :        0
 14 collision count :        0
 15 collision count :        0
 16 collision count :        0

 ====================================================
```

NOTE
Collisions on the first few counts are normal. However, if collisions occur past the 10th count, you should reconfigure your network so devices that mainly talk to each other are on the same segment.

get-rmon-cnt

```
get-rmon-cnt <port>
```

Displays the remote monitoring (RMON) statistics group 1 counters for *port*.

```
SYS_console> get-rmon-cnt 3
 Ethernet RMON Counters for port 3
 ==================================================
 etherStatsOctets      : 890094309
 etherStatsPkts        :   1504371
 etherStatsBcastPkts   :     14024
 etherStatsMcastPkts   :      3834
 etherStatsCRCAllignPkts:        9
 etherStatsUndersizePkts:       18
 etherStatsOversizePkts :        0
 etherStatsRuntPkts     :        6
 etherStatsJabberPkts   :        0
 etherStatsCollisions   :        0
```

get-sdist-cnt

```
get-sdist-cnt <port>
```

Displays the RMON statistics packet size histogram for *port*.

```
SYS_console> get-sdist-cnt 3
 RMON Packet Size Distribution Counters for port 3
 ============================================================
 etherStatsPkts64Octets          :      4352
 etherStatsPkts65to127Octets     :     19845
 etherStatsPkts128to255Octets    :       673
 etherStatsPkts256to511Octets    :      1209
 etherStatsPkts512to1023Octets   :   1471278
 etherStatsPkts1024to1518Octets  :     52163
```

get-br-cnt

```
get-br-cnt <port-number>
```

Displays the switching statistics counters for a port. The command displays the number of:

- packets or bytes received.

- packets forwarded.

- multicast packets.

- packets with unknown destination and subsequently multicast.

- packets transmitted.

- packets lost (if flow control is disabled) or number of packets retransmitted by the originator due to flow control (if flow control is enabled).

- packets or bytes forwarded to each port. For the port you specified, the number of packets or bytes represents filtered frames. Filtered frames are ones that don't need to be forwarded because they're destined for the same port they came in on.

```
SYS_console> get-br-cnt 3
 Ethernet Switching Counters for port 3
 ==================================================
 Frm   Received OK :   1419681
 Bytes Received    : 842637991
 Frm Filtered      :         0
 Frm to all ports  :         0
 Frm multicast     :     16017
 Frm lost/fctrl    :         0
 Transmit OK       :   1404387
```

```
Forward to port   :     FRAMES            BYTES
----------------------------------------------------
       1          :           0                0
       2          :           0                0
       3          :   218103808               60
       4          :     1419823        842711315
       5          :           0                0
       6          :           0                0
       7          :           0                0

 ====================================================
```

get-mgm-brcnt

Displays the counters for the management interface:

```
SYS_console> get-mgm-brcnt

 Management Port Counters
 ================================================
 Frm   Received  :       658
 Bytes Received  :    122135
 Frm    Filtered :       284
 Frm Received Bcast:    305
 Frm Transmited  :       342
 Frm Transmit Ucast:    340
 Frm Transmit Mcast:   1280
 Frm Transmit Bcast:      2
 Received from port:     FRAMES           BYTES
-------------------------------------------------
       1          :           0               0
       2          :           0               0
       3          :           0               0
       4          :         655          121955
       5          :           0               0
       6          :           0               0
       7          :           0               0
 Transmit to port :     FRAMES           BYTES
-------------------------------------------------
       1          :           2             128
       2          :           0               0
       3          :           2             128
       4          :         339           66085
       5          :           2             128
       6          :           2             128
       7          :           2             128
-------------------------------------------------
```

Console command-line summary

Console Commands

`help-kbd`	lists the help and shortcut keys
`banner`	displays the Console Manager logo
`clear`	clears the screen
`login`	exits Console Manager and displays login screen
`logout`	exits Console Manager and any active Telnet session
`set-prompt`	changes the console prompt
`set-passwd`	changes the console password

System Commands

`sys-stat`	displays system status
`warm-reset`	performs a warm reset of the switch
`cold-reset`	performs a cold reset of the switch, like powering it on and off
`get-last-err`	displays information about the last fatal error
`init-nvram`	resets nonvolatile RAM (NVRAM) to default values
`set-line-slip`	transfers the serial connection to SLIP mode
`set-sw-file`	sets the SNMP agent software filename for download
`set-par-file`	sets the SNMP agent parameters filename for automatic setup
`set-fg-param`	sets the Ethernet frame generator parameters
`start-fg`	starts the Ethernet frame generator
`stop-fg`	stops the Ethernet frame generator

IP Commands

`get-ip`	displays the current IP address
`set-ip`	sets the IP address
`get-ip-conf`	displays the current IP address, netmask, and broadcast address
`set-ip-conf`	sets the IP address, netmask, and broadcast address
`set-slip`	sets the SLIP address
`get-slip`	displays the SLIP address
`get-slip-conf`	displays the current SLIP configuration
`set-slip-conf`	sets the SLIP configuration
`get-gatew`	displays the default gateway

IP Commands (*con't*)

`set-gatew`	sets the default gateway
`get-arp-tbl`	displays the Address Resolution Protocol (ARP) table
`del-arp-entry`	deletes one or all entries from the ARP table
`add-arp-entry`	adds an entry to the ARP table
`get-bootp`	displays the state of the BOOTP process
`set-bootp`	enables or disables the BOOTP process
`ping`	contacts another IP device
`ping-stop`	stops the ping process
`get-def-ttl`	displays the running default TTL (time to live) value
`set-def-ttl`	modifies the running default TTL value

SNMP Commands

`get-comm`	shows the current read or write community
`set-comm`	changes the read or write community
`get-auth`	shows the trap authentication mode
`set-auth`	sets the trap authentication mode
`get-traps`	shows the destination stations in the trap list
`add-trap`	adds a destination station to the trap list
`del-trap`	deletes a destination station from the trap list

Switching Database Commands

`get-lt-entry`	displays a switching database entry
`get-lt-16`	displays 16 switching database entries starting at a given item number
`find-lt-addr`	searches for an address in the switching database
`del-lt-entry`	removes a switching database entry
`del-lt-addr`	removes the switching database entry for a given address
`add-lt-entry`	adds a switching database entry
`add-cf-entry`	adds a custom filter entry
`del-cf-entry`	deletes a custom filter entry
`get-nv-cftbl`	displays the saved custom filters table
`get-nv-cfilt`	displays the saved custom filters for a given MAC address
`get-lt-age`	displays the switching database aging period
`set-lt-age`	sets the switching database aging period

Virtual LAN (VLAN) Commands

`set-vbc-domain`	defines a Virtual Broadcast Domain (VBD)
`del-vbc-domain`	deletes a VBD
`get-vbc-tbl`	displays the VBD table
`set-sec-vlan`	defines a Security Virtual LAN (SVLAN)
`del-sec-vlan`	deletes an SVLAN
`get-svlan-tbl`	displays the SVLAN table
`set-mon-port`	sets the monitoring port
`monitor`	starts port monitoring
`stop-mon`	stops port monitoring
`get-lt-filter`	displays the filter for a given MAC address
`get-con-matrix`	displays the VLAN connectivity matrix
`get-vbc-matrix`	displays the VBC connectivity matrix

Spanning Tree Commands

`get-stp`	displays the spanning tree session state
`set-stp`	enables or disables the spanning tree for the next session
`get-st-bcfg`	displays the spanning tree bridge parameters
`get-st-pcfg`	displays the spanning tree port parameters table
`get-st-syscfg`	displays the spanning tree system ports configuration
`set-br-prio`	sets the spanning tree bridge priority
`set-br-maxage`	sets the spanning tree bridge maximum age
`set-br-hellot`	sets the spanning tree bridge hello time
`set-br-fwdel`	sets the spanning tree bridge forward delay
`set-prt-prio`	sets the spanning tree port priority
`set-prt-enb`	enables or disables the spanning tree port
`set-prt-pcost`	sets the spanning tree port path cost

Port Configuration Commands

`get-port-cfg`	displays the configuration of all the ports
`set-port-dplex`	sets a port's duplex mode to half or full
`set-port-fctrl`	sets a port's flow control on or off

Switching Statistics Commands

`clr-cnt`	resets the counters for Ethernet and bridging statistics
`get-eth-cnt`	displays the Ethernet statistics for a port
`get-colls-cnt`	displays the collision distribution statistics for a port
`get-rmon-cnt`	displays the Ethernet RMON statistics for a port
`get-sdist-cnt`	displays the packet size distribution statistics for a port
`get-br-cnt`	displays the switching statistics for a port
`get-mgm-brcnt`	displays the switching statistics of the management port

3 Troubleshooting

If there is an operating problem with the Express Switching Hub, incorrect configuration or cabling is probably the cause. Try the troubleshooting steps below in order:

1 **Verify that your cables are wired correctly**. This is the most common problem. Use a UTP crossover cable to directly connect another switch, server, or workstation to the switch. Use a straight-through cables when connecting to a repeater. See page 8 for more information.

2 Make sure the unit is plugged into a grounded, functioning AC outlet providing between 90 VAC and 264 VAC at 50/60 Hz.

3 Review the Link LEDs of other devices to ensure that those ports you believe should be functioning are properly attached to the switch with a Category 5 UTP cable.

4 Review the switch's Link LEDS to ensure that ports you believe should be functioning are properly configured, and not disabled or partitioned.

5 If you configured a port for full duplex, make sure the device on the other end is configured for full duplex and is capable of transmitting in full duplex. Remember, you must have a point-to-point connection for a full-duplex link. Most repeaters aren't capable of full duplex.

6 If the FC/FD LED shows excessive activity, see Chapter 1 for recommendations on dealing with excessive flow control.

7 Make sure that the equipment attached to the switch is properly configured. If the CLSN LED is on continuously, you may have a problem with an adapter on the segment.

8 Use the Console Manager to check the switch's status. Use the `sys-stat` command to check the overall system status and the `get-port-cfg` command to check the status of each port.

If you encounter any situations or problems you cannot solve, get the following information:

• The serial number of the Express Switching Hub printed on the back side of the switch.

• The firmware revision number displayed in the Console Manager `sys-stat` message.

• The configuration of the equipment connected to the switch.

• The sequence of events leading up to your problem.

• Actions you have already taken.

If you call Intel Customer Support, you have 90 days of free support after your first call. Thereafter, Intel offers several pay-for-support options.

A Technical Information

This chapter contains detailed information on default port and switch configuration options, product specifications, and supported standards for SNMP and MIB features.

Default Configuration

System

Internal software filename: flash07.hex

Database aging time: 300 seconds

SNMP:	Read community: public
	Write community: private
	Authentication mode: enable
	Traps manager: None
IP:	BOOTP: disabled
	TTL: 10 (in range 1 to 255)
	Authentication mode: enable
	Traps manager: None

Ports 1-2

Not installed (optional equipment)

Ports 3-7

Type:	100BASE-TX, twisted-pair Ethernet (TPE)
Duplex mode:	Half
Flow control:	On

Console Manager

Communications parameters: 9600 baud, 8-N-1

Login name: *None*

Password: *None*

Prompt: `SYS_console>`

Spanning tree

Spanning tree:	Enabled	
Bridge priority:	32768	0-65535
Bridge max. age:	20	6.0-40.0 sec.
Bridge hello time:	2	1.0-10.0 sec.
Bridge forward delay:	15	4.0-30.0 sec.
Port priority:	128	0-255
Port cost:		10 (1000/LAN speed in Mbps)

Specifications

Features

Buffer size: 28KB per port/140KB total

Architecture: Store and forward for complete runt and error filtering on all packets. Flow control prevents packet loss.

MAC addresses supported: 1024 total

Address table: Transparent, automatic self-learning at full wire speed. Cache aging time manageable. Custom filtering by hardware address and port.

Network Management

In-band and out-of-band SNMP with MIB II, private MIB and out-of-band serial console support.

Status Indicators (per port)

Displays Link, Transmit, Receive, Collision, Flow Control/Full Duplex, Management.

General Indicators

Displays Management activity, SNMP presence, power supply status, device failure detection.

Boot and Configuration

NVRAM configuration loaded on power up and fully downloadable. Firmware local or remote downloadable.

Connector Interfaces

UTP RJ-45 (MDI pin configuration)

RS232

SC fiber optic (on optional 100BASE-FX media adapter)

Maximum Cabling Distances

Switch to switch or switch to NIC:

Category 5 UTP: 328 feet (100 meters)

62.5/125μ multimode fiber: 1.2 miles (2 km) at full duplex
1351 feet (412 meters) at half duplex

Switch to repeater:

Category 5 UTP: 328 feet (100 meters)

62.5/125μ multimode fiber: Varies, ~1050 feet (320 meters) total network diameter

Standards Supported

100BASE-TX Fast Ethernet

100BASE-FX Fast Ethernet

FDSE (Full Duplex Switched Ethernet)

IEEE 802.3u (Fast Ethernet)

IEEE 802.1d (Spanning Tree)

SNMP (RFC 1157, etc.)

MIB II (RFC 1213, etc.)

Bridge MIB (RFC 1493)

Mounting

Standard 19-inch rack, with mounting brackets

1-inch minimum clearance, sides and back

Electrical Specifications

Input power: 55W maximum

AC line frequency: 50-60 Hz

Input voltage (rms): 90-260 VAC

Fuse: 1 Amp maximum at 220V, 2 Amp maximum at 155V

Power Cord Specifications

115 volt configuration:
Minimum type SJT (SVT) 18/3, rated 250 Volts AC, 10 Amps with a
maximum length of 15 feet. One end is terminated in an IEC 320
attachment plug, the other in a NEMA 5-15P plug.

230 volt configuration:
Minimum type SJT (SVT) 18/3, rated 250 Volts AC, 10 Amps with a
maximum length of 15 feet. One end is terminated in an IEC 320
attachment plug. The other end is terminated as required by the country
where it will be installed.

Electromagnetic Emissions and Safety Agency Approval

FCC Part 15, Subpart J, Class A

EN 55022 (CISPR22: 1985), Class A

VCCI Class 1 ITE

EN50082-1

UL listed (UL 1950)

IEC 950/EN 60 950 (TUV)

CE Mark

CSA certified (CSA 22.2 #950) - pending

Environment

Operating temperature: 0 ~ 40° C (32 ~ 104° F)

Storage temperature: -10 ~ 65° C (14 ~ 149° F)

Humidity: < 85% (noncondensing)

ETL (UL-1950), TUV/VDE, CSA

SNMP and MIB Support

The Express Switching Hub contains a built-in SNMP agent running on the SNMP processor board. This allows each Express Switching Hub to be managed from a centralized management station via any SNMP-compliant NMS.

The SNMP agent software complies with the following standards:

- RFC 1155, The Structure of Management Information (SMI) for TCP/IP Based Internets, 5/90.
- RFC 1556, Management Information Base (MIB) for Network Managers of TCP/IP Based Internets, 5/90.
- RFC 1557, The Simple Network Management Protocol (SNMP), 5/90.
- RFC 1213, The Management Information Base II (MIB II), 3/91.
- RFC 1643, Definitions of Managed Objects for the Ethernet-like Interface Types.
- RFC 1573, Evolution of the Interfaces Group of MIB-II, 1/94.
- RFC 1493, Definitions of Managed Objects for Bridges, 7/93.
- RFC 793, Transmission Control Protocol.
- RFC 854, Telnet Protocol Specification.
- RFC 1055, Nonstandard for transmission of IP datagrams over serial lines: SLIP, 1/88.

The SNMP agent uses UDP/IP (RFC 768, RFC 950, RFC 1071 and RFC 791) as OSI layers 3 and 4 protocols, and ICMP (RFC 792) and ARP (RFC 826) to complete the UDP/IP protocol suite.

The UDP/IP stack implementation is conformant to:

- RFC 1122, Requirements for Internet hosts, communication layers.
- RFC 1123, Requirements for Internet hosts, application and support.

The Express Switching Hub may be managed by any SNMP Manager that conforms to the above standards.

The Express Switching Hub implements an Intel Enterprise MIB. Download SWCH1MIB.EXE from the Intel Customer Support World Wide Web site (http://www-cs.intel.com) or Intel's FTP site (see inside back cover).

Custom Filter Port Table

The following table contains hexadecimal bitmask equivalents for custom filter source and destination port combinations. Use this table with the `add-cf-entry` command. See page 22 for instructions on creating custom filters.

Source Ports

Note
Commas separate a range of ports. For example, 1,2 means source ports 1 and 2.

Port(s)	Enter...	Port(s)	Enter...	Port(s)	Enter...
1	1	5,6	30	2,5,6	32
2	2	5,7	50	2,5,7	52
3	4	6,7	60	2,6,7	62
4	8	1,2,3	7	3,4,5	1C
5	10	1,2,4	B	3,4,6	2C
6	20	1,2,5	13	3,4,7	4C
7	40	1,2,6	23	3,5,6	34
1,2	3	1,2,7	43	3,5,7	54
1,3	5	1,3,4	D	3,6,7	64
1,4	9	1,3,5	15	4,5,6	38
1,5	11	1,3,6	25	4,5,7	58
1,6	21	1,3,7	45	4,6,7	68
1,7	41	1,4,5	19	5,6,7	70
2,3	6	1,4,6	29	1,2,3,4	F
2,4	A	1,4,7	49	1,2,3,5	17
2,5	12	1,5,6	31	1,2,3,6	27
2,6	22	1,5,7	51	1,2,3,7	47
2,7	42	1,6,7	61	1,2,4,5	1B
3,4	C	2,3,4	E	1,2,4,6	2B
3,5	14	2,3,5	16	1,2,4,7	4B
3,6	24	2,3,6	26	1,2,5,6	33
3,7	44	2,3,7	46	1,2,5,7	53
4,5	18	2,4,5	1A	1,2,6,7	63
4,6	28	2,4,6	2A	1,3,4,5	1D
4,7	48	2,4,7	4A	1,3,4,6	2D

Source Ports (*con't*)

Port(s)	Enter...	Port(s)	Enter...	Port(s)	Enter...
1,3,4,7	4D	2,5,6,7	72	1,3,4,5,7	5D
1,3,5,6	35	3,4,5,6	3C	1,3,4,6,7	6D
1,3,5,7	55	3,4,5,7	5C	1,3,5,6,7	75
1,3,6,7	65	3,4,6,7	6C	1,4,5,6,7	79
1,4,5,6	39	3,5,6,7	74	2,3,4,5,6	3E
1,4,5,7	59	4,5,6,7	78	2,3,4,5,7	5E
1,4,6,7	69	1,2,3,4,5	1F	2,3,4,6,7	6E
1,5,6,7	71	1,2,3,4,6	2F	2,3,5,6,7	76
2,3,4,5	1E	1,2,3,4,7	4F	2,4,5,6,7	7A
2,3,4,6	2E	1,2,3,5,6	37	3,4,5,6,7	7C
2,3,4,7	4E	1,2,3,5,7	57	1,2,3,4,5,6	3F
2,3,5,6	36	1,2,3,6,7	67	1,2,3,4,5,7	5F
2,3,5,7	56	1,2,4,5,6	3B	1,2,3,4,6,7	6F
2,3,6,7	66	1,2,4,5,7	5B	1,2,3,5,6,7	77
2,4,5,6	3A	1,2,4,6,7	6B	1,2,4,5,6,7	7B
2,4,5,7	5A	1,2,5,6,7	73	1,3,4,5,6,7	7D
2,4,6,7	6A	1,3,4,5,6	3D	2,3,4,5,6,7	7E

Destination Ports

Port(s)	Enter...	Port(s)	Enter...	Port(s)	Enter...
0	1	4,7	90	1,3,6	4A
1	2	5,6	60	1,3,7	8A
2	4	5,7	A0	1,4,5	32
3	8	6,7	C0	1,4,6	52
4	10	0,1,2	7	1,4,7	92
5	20	0,1,3	B	1,5,6	62
6	40	0,1,4	13	1,5,7	A2
7	80	0,1,5	23	1,6,7	C2
0,1	3	0,1,6	43	2,3,4	1C
0,2	5	0,1,7	83	2,3,5	2C
0,3	9	0,2,3	D	2,3,6	4C
0,4	11	0,2,4	15	2,3,7	8C
0,5	21	0,2,5	25	2,4,5	34
0,6	41	0,2,6	45	2,4,6	54
0,7	81	0,2,7	85	2,4,7	94
1,2	6	0,3,4	19	2,5,6	64
1,3	A	0,3,5	29	2,5,7	A4
1,4	12	0,3,6	49	2,6,7	C4
1,5	22	0,3,7	89	3,4,5	38
1,6	42	0,4,5	31	3,4,6	58
1,7	82	0,4,6	51	3,4,7	98
2,3	C	0,4,7	91	3,5,6	68
2,4	14	0,5,6	61	3,5,7	A8
2,5	24	0,5,7	A1	3,6,7	C8
2,6	44	0,6,7	C1	4,5,6	70
2,7	84	1,2,3	E	4,5,7	B0
3,4	18	1,2,4	16	4,6,7	D0
3,5	28	1,2,5	26	5,6,7	E0
3,6	48	1,2,6	46	0,1,2,3	F
3,7	88	1,2,7	86	0,1,2,4	17
4,5	30	1,3,4	1A	0,1,2,5	27
4,6	50	1,3,5	2A	0,1,2,6	47

Destination Ports (*con't*)

Port(s)	Enter...	Port(s)	Enter...	Port(s)	Enter...
0,1,2,7	87	1,2,3,5	2E	3,5,6,7	E8
0,1,3,4	1B	1,2,3,6	4E	4,5,6,7	F0
0,1,3,5	2B	1,2,3,7	8E	0,1,2,3,4	1F
0,1,3,6	4B	1,2,4,5	36	0,1,2,3,5	2F
0,1,3,7	8B	1,2,4,6	56	0,1,2,3,6	4F
0,1,4,5	33	1,2,4,7	96	0,1,2,3,7	8F
0,1,4,6	53	1,2,5,6	66	0,1,2,4,5	37
0,1,4,7	93	1,2,5,7	A6	0,1,2,4,6	57
0,1,5,6	63	1,2,6,7	C6	0,1,2,4,7	97
0,1,5,7	A3	1,3,4,5	3A	0,1,2,5,6	67
0,1,6,7	C3	1,3,4,6	5A	0,1,2,5,7	A7
0,2,3,4	1D	1,3,4,7	9A	0,1,2,6,7	C7
0,2,3,5	2D	1,3,5,6	6A	0,1,3,4,5	3B
0,2,3,6	4D	1,3,5,7	AA	0,1,3,4,6	5B
0,2,3,7	8D	1,3,6,7	CA	0,1,3,4,7	9B
0,2,4,5	35	1,4,5,6	72	0,1,3,5,6	6B
0,2,4,6	55	1,4,5,7	B2	0,1,3,5,7	AB
0,2,4,7	95	1,4,6,7	D2	0,1,3,6,7	CB
0,2,5,6	65	1,5,6,7	E2	0,1,4,5,6	73
0,2,5,7	A5	2,3,4,5	3C	0,1,4,5,7	B3
0,2,6,7	C5	2,3,4,6	5C	0,1,4,6,7	D3
0,3,4,5	39	2,3,4,7	9C	0,1,5,6,7	E3
0,3,4,6	59	2,3,5,6	6C	0,2,3,4,5	3D
0,3,4,7	99	2,3,5,7	AC	0,2,3,4,6	5D
0,3,5,6	69	2,3,6,7	CC	0,2,3,4,7	9D
0,3,5,7	A9	2,4,5,6	74	0,2,3,5,6	6D
0,3,6,7	C9	2,4,5,7	B4	0,2,3,5,7	AD
0,4,5,6	71	2,4,6,7	D4	0,2,3,6,7	CD
0,4,5,7	B1	2,5,6,7	E4	0,2,4,5,6	75
0,4,6,7	D1	3,4,5,6	78	0,2,4,5,7	B5
0,5,6,7	E1	3,4,5,7	B8	0,2,4,6,7	D5
1,2,3,4	1E	3,4,6,7	D8	0,2,5,6,7	E5

Destination Ports (*con't*)

Port(s)	Enter...	Port(s)	Enter...	Port(s)	Enter...
0,3,4,5,6	79	2,3,4,5,7	BC	0,2,3,4,5,7	BD
0,3,4,5,7	B9	2,3,4,6,7	DC	0,2,3,4,6,7	DD
0,3,4,6,7	D9	2,3,5,6,7	EC	0,2,3,5,6,7	ED
0,3,5,6,7	E9	2,4,5,6,7	F4	0,2,4,5,6,7	F5
0,4,5,6,7	F1	3,4,5,6,7	F8	0,3,4,5,6,7	F9
1,2,3,4,5	3E	0,1,2,3,4,5	3F	1,2,3,4,5,6	7E
1,2,3,4,6	5E	0,1,2,3,4,6	5F	1,2,3,4,5,7	BE
1,2,3,4,7	9E	0,1,2,3,4,7	9F	1,2,3,4,6,7	DE
1,2,3,5,6	6E	0,1,2,3,5,6	6F	1,2,3,5,6,7	EE
1,2,3,5,7	AE	0,1,2,3,5,7	AF	1,2,4,5,6,7	F6
1,2,3,6,7	CE	0,1,2,3,6,7	CF	1,3,4,5,6,7	FA
1,2,4,5,6	76	0,1,2,4,5,6	77	2,3,4,5,6,7	FC
1,2,4,5,7	B6	0,1,2,4,5,7	B7	0,1,2,3,4,5,6	7F
1,2,4,6,7	D6	0,1,2,4,6,7	D7	0,1,2,3,4,5,7	BF
1,2,5,6,7	E6	0,1,2,5,6,7	E7	0,1,2,3,4,6,7	DF
1,3,4,5,6	7A	0,1,3,4,5,6	7B	0,1,2,3,5,6,7	EF
1,3,4,5,7	BA	0,1,3,4,5,7	BB	0,1,2,4,5,6,7	F7
1,3,4,6,7	DA	0,1,3,4,6,7	DB	0,1,3,4,5,6,7	FB
1,3,5,6,7	EA	0,1,3,5,6,7	EB	0,2,3,4,5,6,7	F0
1,4,5,6,7	F2	0,1,4,5,6,7	F3	1,2,3,4,5,6,7	FE
2,3,4,5,6	7C	0,2,3,4,5,6	7D		

Limited Warranty

Intel warrants to the original owner that the product delivered in this package will be free from defects in material and workmanship for one (1) year following the latter of: (i) the date of purchase only if you register by returning the registration card as indicated thereon with proof of purchase; or (ii) the date of manufacture; or (iii) the registration date if by electronic means provided such registration occurs within 30 days from purchase.   This warranty does not cover the product if it is damaged in the process of being installed. Intel recommends that you have the company from whom you purchased this product install the product.

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Intel Corporation
5200 NE Elam Young Parkway
Hillsboro, OR 97124

FCC Notice

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The user is cautioned that changes and modifications made to the equipment without approval of the manufacturer could void the user's authority to operate this equipment.

Manufacturer declaration

This certifies that the Intel Express 100BASE-TX Switching Hub complies with the EU Directive 89/33/EEC, using the EMC standards EN55022 (Class A) and EN50082-1. This product also meets or exceeds EN 60950 (TUV) requirements. This product has been tested and verified to meet CISPR 22 Class A requirements.

I Index

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Troubleshooting	Yes	Yes	Yes	Yes
Software updates	Yes	Yes	Yes	No
Installation notes	Yes	Yes	Yes	Yes
Compatibility lists	Yes	Yes	Yes	Yes
Product information	Yes	No	No	No
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